Low Resolution Brain Elecromagnetic Tomography (LORETA) is a method of quantitative EEG (QEEG), which permits 3D tomography of electrical brain activity. Positron emission tomography (PET) reflects changes of brain metabolism and regional blood flow. The aim of the thesis was to evaluate the neurobiological correlates of changes in psychopathology during treatment of schizophrenia and depression, revealed by QEEG and PET, subsequently to evaluate the applicability of these two methods, and third to compare the mechanism of two therapeutic tools, antipsychotics and low-frequency repetitive transcranial magnetic stimulation (LF-rTMS) from QEEG point of view. The first part contains the theoretical information about disorders and therapeutic tools and the review of QEEG and PET findings. The empirical part is based on four articles (Tislerova et al., 2008; Horacek et al., 2007; Kopecek et al., 2011; Kopecek et al., 2008) and a common discussion constitutes the end part. In the study 1, we compared schizophrenic patients treated with olanzapine or clozapine with antipsychotic-naive patients. We found changes of electrical activity in anterior cingulate and in temporo-limbic structures. In the study 2 we studied schizophrenic patients with auditory hallucinations treated by LF-rTMS. The clinical improvement was associated with the decrease of metabolism in the temporal cortex underlying the site and with the increase contralaterally and frontally. The changes of electrical activity were consistent moreover were detected in anterior cingulate. Our findings of the study 3 implicate that the antidepressant effect of LF-rTMS is connected with electrical changes prefrontally. The case study 4 represents an individual evaluation of QEEG during the treatment of depression. With respect to our findings, we can summarize that the neurobiological correlates of clinical improvement in schizophrenia are changes of neuronal activity in the frontal cortex, anterior cingulate and temporo-limbic structures, in depression in the prefrontal cortex. Our results document the sensitivity of both QEEG and PET for psychopathology changes. The QEEG changes during treatment with antipsychotics and LF-rTMS could suggest a compensatory mechanism in the neurophysiological substrate for schizophrenia and depression.